

Figur s

Figure 1

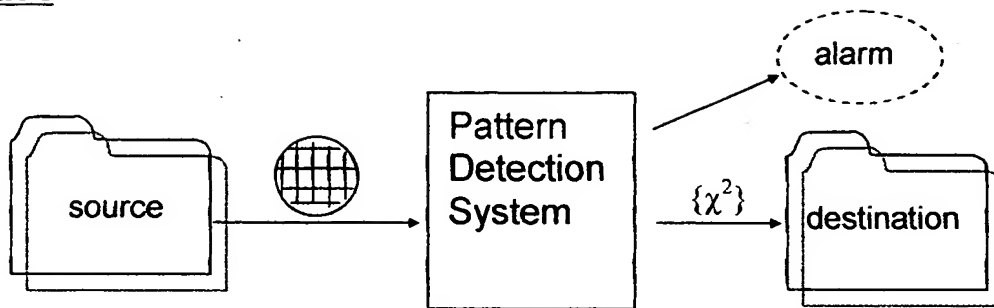


Figure 1 shows a schematic for a pattern detection system, including a data source; a computer equipped with a program for interpreting events in the data for each wafer and making the chi-squared calculations; and a result destination. Source and destination are represented by folders and the " $\{\chi^2\}$ " represents the collection of chi-squared values. Results may be sent to the destination in the form of a summary or may be inserted back into the data, which is then sent to the destination. The system may be configured to raise an alarm under certain conditions when chi-squared values exceed a specified threshold.

Figure 2

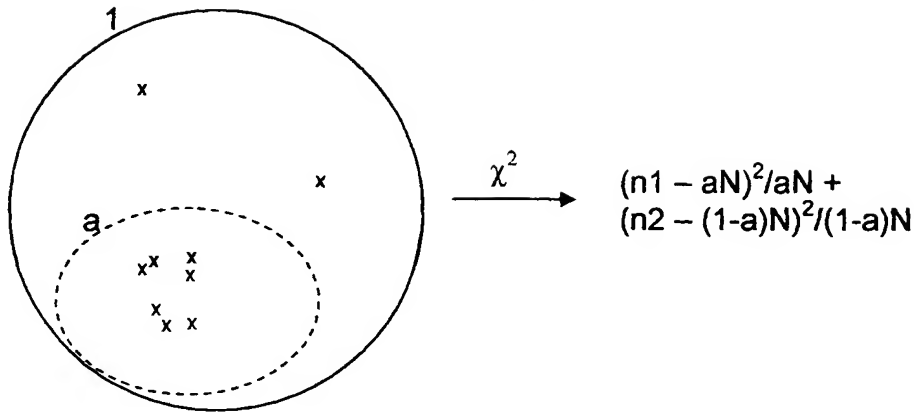


Figure 2 shows a wafer of area 1 and sub-region of area 'a' with events marked by "x". The area outside the subregion is (1-a). There are n1 events inside the sub-region and n2 outside the subregion, with $N=n1+n2$ total events, and (1-a) corresponding to the area outside the subregion. The chi squared value (χ^2) for the null hypothesis that the events are random is $[(n1-aN)^2 / aN] + [(n2-(1-a)N)^2 / (1-a)N]$

Figure 3

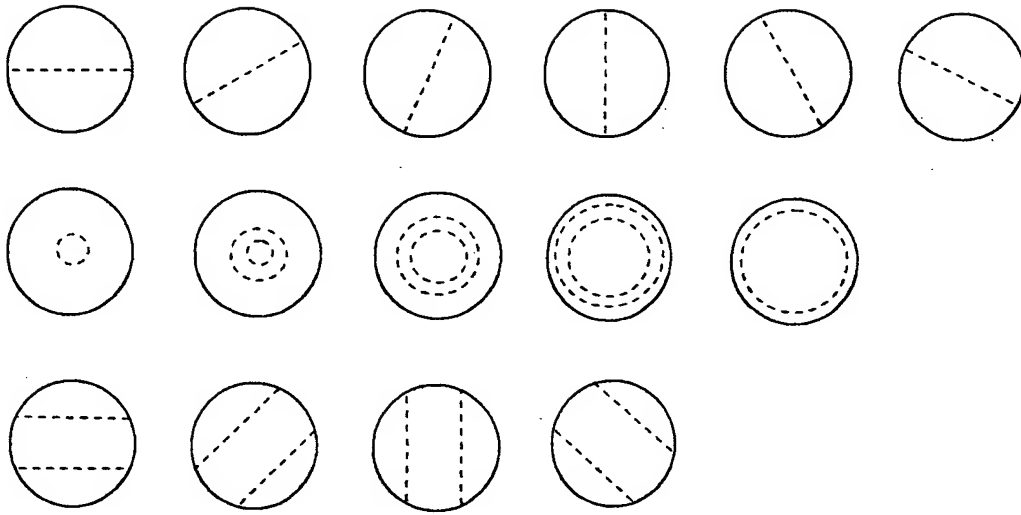


Figure 3. Top rows shows 6 lateral subdivisions of the wafer region, subdivision by diameter lines at angles in increments of 30 degrees. Middle row shows 5 concentric radial subdivisions, in radial increments of $\text{radius}/5$. Bottom row shows axial regions of width $= \text{diameter}/3$, at angles incrementing by 45 degrees.

Figure 4

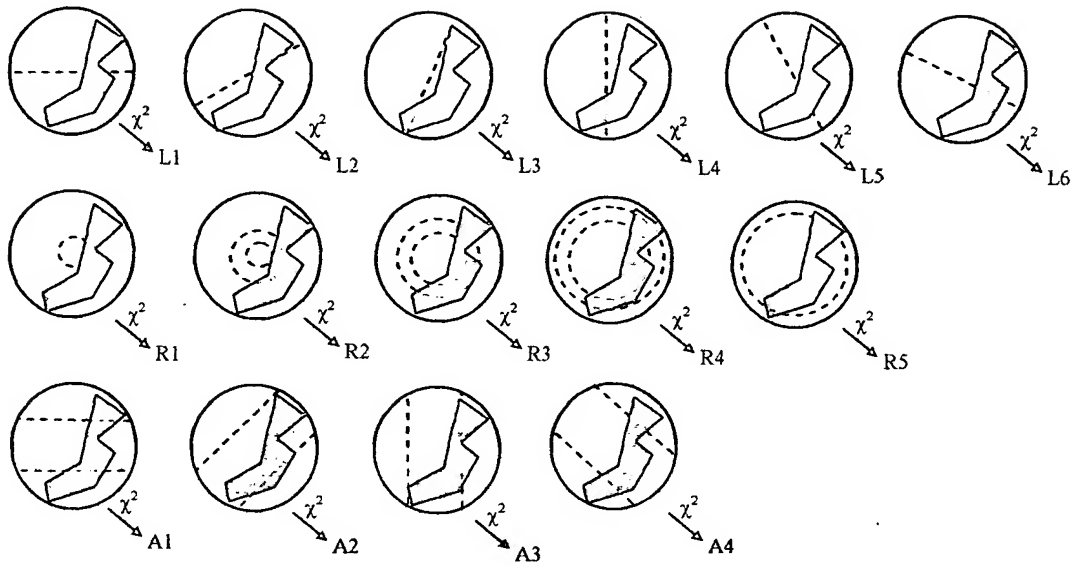


Figure 4 The events on the wafer are represented by an irregular grey domain. The illustration shows the calculation of 6 lateral chi-squared values (L1-L6), and 5 radial chi-squared values (R1-R5), and 4 axial chi-squared values (A1-A4). The system also calculates these summaries

$$LMax = MAX(L1, L2, L3, L4, L5, L6)$$

$$RMax = MAX(R1, R2, R3, R4, R5)$$

$$AMax = MAX(A1, A2, A3, A4)$$

$$ChiMax = MAX(LMax, RMax, AMax)$$

Note in the illustration that L3, R5, and A2 will be the largest values

Figure 5

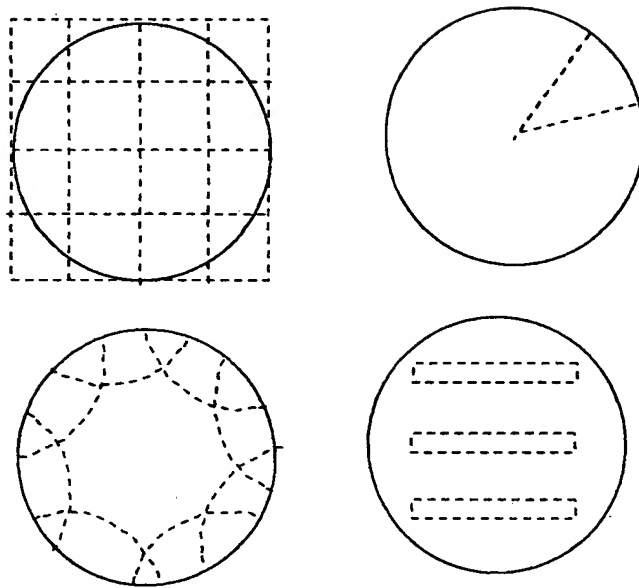


Figure 5 shows other obvious divisions into sub-regions of the wafer map area. Top row shows rectangular tiles, and angular sectors. Bottom row shows arc regions around the wafer edge and specialized rectangular zones.